

U.S. Patent Application No. 09/973,624
Amendment dated May 27, 2008
Reply to Office Action of February 27, 2008

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AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Canceled)
2. (Previously presented) A non-oxide powder of which at least about 40% by mass is comprised of a plurality of tightly agglomerated compositions, each of said tightly agglomerated compositions comprising a plurality of primary particles tightly agglomerated together, wherein said primary particles have an average size in a range of about 1 nanometer to about 500 nanometers, wherein for each tightly agglomerated composition, at least about 60% of its constituent primary particles are within $2.25dN^{1/3}$ nanometers of at least about 60% of its other constituent primary particles, wherein N represents the number of primary particles in the tightly agglomerated composition, and wherein d represents the average size of the primary particles in the tightly agglomerated composition.
3. (Original) The non-oxide powder of claim 2 wherein said primary particles are selected from the group consisting of metals, intermetallics, metal matrix composites, ceramics, and non-metals.
4. (Original) The non-oxide powder of claim 3 wherein, for each tightly agglomerated composition, at least about 60% of its constituent primary particles are within $2.25dN^{1/3}$ nanometers of all its other primary particles.
5. (Original) The non-oxide powder of claim 3 wherein, for each tightly agglomerated composition, at least about 50% of its constituent primary particles have sizes not deviating by more than a factor of 2 from the average size of its constituent primary particles, and at least about 90% of its constituent primary particles have sizes not deviating by more than a factor of 4 from the average size of its primary particles.

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6. (Original) The non-oxide powder of claim 3 wherein, for each tightly agglomerated composition, at least about 80% of its primary particles are within $2.25dN^{1/3}$ nanometers of at least about 80% of its other primary particles.

7. (Original) The non-oxide powder of claim 3 wherein each of said tightly agglomerated compositions are comprised of at least 20 of said primary particles agglomerated together.

8. (Original) The non-oxide powder of claim 7 wherein, for each tightly agglomerated composition, at least about 60% of its primary particles are not closer than $dN^{1/3}$ nanometers of at least about 60% of its other primary particles.

9. (Original) The non-oxide powder of claim 3 wherein at least about 75% by mass of said powder is comprised of said tightly agglomerated compositions.

10. (Previously presented) The non-oxide powder of claim 3 wherein at least one of said tightly agglomerated compositions further comprises a secondary material within which the primary particles of said at least one agglomerated composition are encapsulated.

11. (Original) The non-oxide powder of claim 10 wherein said secondary material is selected from the group consisting of salts and polymers.

12. (Original) The non-oxide powder of claim 11 wherein each of said tightly agglomerated compositions further comprises a secondary material within which its primary particles are encapsulated.

13. (Original) The non-oxide powder of claim 11 wherein said powder has an encapsulation efficiency in the range of about 10% to about 99% by mass.

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14. (Original) The non-oxide powder of claim 13 wherein said powder has an encapsulation efficiency in the range of about 70% to about 99% by mass.
15. (Original) The non-oxide powder of claim 3 wherein said primary particles are selected from the group consisting of metals.
16. (Previously presented) The non-oxide powder of claim 15 wherein said primary particles are selected from the group consisting of valve metals.
17. (Original) The non-oxide powder of claim 16 wherein said primary particles are tantalum.
18. (Original) The non-oxide powder of claim 17 wherein each of said tightly agglomerated compositions has a specific surface area in the range of about 1 m²/g to about 70 m²/g.
19. (Original) The non-oxide powder of claim 16 wherein said primary particles are niobium.
20. (Original) The non-oxide powder of claim 15 wherein said primary particles are selected from the group consisting of refractory metals.
21. (Original) The non-oxide powder of claim 3 wherein said primary particles are selected from the group consisting of carbon and boron.
22. (Original) The non-oxide powder of claim 3 wherein said primary particles are selected from the group consisting of ceramics.
23. (Original) The non-oxide powder of claim 3 wherein said primary particles are selected from the group consisting of intermetallics.

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24. (Original) The non-oxide powder of claim 3 wherein said primary particles are selected from the group consisting of metal matrix composites.

25. (Original) The non-oxide powder of claim 3 wherein said powder has a primary particle purity based on metal contaminants of less than about 10,000 parts per million by mass.

26. (Original) The non-oxide powder of claim 25 wherein said powder has a primary particle purity based on metal contaminants of less than about 1000 parts per million by mass.

27. (Original) The non-oxide powder of claim 26 wherein said powder has a primary particle purity based on metal contaminants of less than about 50 parts per million by mass.

28. (Previously presented) The non-oxide powder of claim 2 wherein said primary particles have an average size in a range of about 1 nanometer to about 100 nanometers

29-54 (Canceled)

55. (Previously presented) A powder comprising:

a plurality of primary particles, each primary particle having a size in the range of about 1 nanometer to about 500 nanometers; and

a secondary material within which at least some of said primary particles are encapsulated;

wherein a plurality of said primary particles are agglomerated together;

wherein between about 10% and about 100% of said primary particles are encapsulated in said secondary material;

wherein said primary particles are selected from the group consisting of metals, intermetallics, metal matrix composites, ceramics, and non-metals; and

wherein said secondary material is selected from the group consisting of salts and polymers.

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56. (Original) The powder of claim 55 wherein said primary particles are selected from the group consisting of metals.
57. (Original) The powder of claim 56 wherein said primary particles are selected from the group consisting of valve metals.
58. (Original) The powder of claim 57 wherein said primary particles are tantalum.
59. (Original) The powder of claim 58 wherein said agglomeration of tantalum particles has a specific surface area in the range of about 1 m²/g to about 70 m²/g.
60. (Original) The powder of claim 56 wherein said primary particles are selected from the group consisting of refractory metals.
61. (Original) The powder of claim 55 wherein said primary particles are selected from the group consisting of carbon and boron.
62. (Original) The powder of claim 55 wherein said primary particles are selected from the group consisting of ceramics.
63. (Original) The powder of claim 55 wherein said primary particles are selected from the group consisting of intermetallics.
64. (Original) The powder of claim 55 wherein said primary particles are selected from the group consisting of metal matrix composites.
65. (Original) The powder of claim 55 wherein said secondary material is NaCl.
66. (Original) The powder of claim 55 wherein said secondary material is removable.

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67. (Original) A capacitor-grade powder of which at least about 40% by mass is comprised of a plurality of tight agglomerations of primary particles, each tight agglomeration comprising at least 20 primary particles, said primary particles having an average size in the range of about 1 nanometer to about 200 nanometers and being selected from the group consisting of valve metals, wherein for each of said tight agglomerations, at least about 60% of its constituent primary particles are within $2.25dN^{1/3}$ nanometers of at least about 60% of its other constituent primary particles, wherein N represents the number of primary particles in the same tight agglomeration, and wherein d represents the average size of said primary particles.

68. (Original) The capacitor-grade powder of claim 67 wherein said powder has a primary particle purity based on metal contaminants of less than about 1000 parts per million by mass.

69. (Original) The capacitor-grade powder of claim 67 wherein at least one of said tight agglomerations further comprises a secondary material within which the primary particles of that tight agglomeration are encapsulated, said secondary material being selected from the group consisting of salts and polymers.

70. (Original) The capacitor-grade powder of claim 67 wherein said powder has an encapsulation efficiency in the range of about 70% to about 100% by mass.

71-79 (Canceled)

80. (Previously presented) The non-oxide powder of claim 28 wherein said primary particles are selected from the group consisting of metals, intermetallics, metal matrix composites, ceramics, and non-metals.

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81. (Previously presented) The non-oxide powder of claim 80 wherein each of said tightly agglomerated compositions are comprised of at least 20 of said primary particles agglomerated together.
82. (Previously presented) The non-oxide powder of claim 80 wherein at least about 75% by mass of said powder is comprised of said tightly agglomerated compositions.
83. (Previously presented) A non-oxide powder of which at least about 40% by mass is comprised of a plurality of tightly agglomerated compositions, each of said tightly agglomerated compositions comprising a plurality of primary particles tightly agglomerated together, wherein said primary particles have an average size in a range of about 1 nanometer to about 100 nanometers, wherein said primary particles are selected from the group consisting of metals, intermetallics, metal matrix composites, ceramics, and non-metals, and wherein at least one of said tightly agglomerated compositions further comprises a secondary material within which the primary particles of said at least one agglomerated composition are encapsulated.
84. (Previously presented) The non-oxide powder of claim 83 wherein said secondary material is selected from the group consisting of salts and polymers.
85. (Previously presented) The non-oxide powder of claim 84 wherein each of said tightly agglomerated compositions further comprises a secondary material within which its primary particles are encapsulated.
86. (Previously presented) The non-oxide powder of claim 85 wherein said powder has an encapsulation efficiency in the range of about 10% to about 99% by mass.
87. (Previously presented) The non-oxide powder of claim 86 wherein said powder has an encapsulation efficiency in the range of about 70% to about 99% by mass.

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88. (Previously presented) The non-oxide powder of claim 80 wherein said primary particles are selected from the group consisting of metals.

89. (Previously presented) The non-oxide powder of claim 88 wherein said primary particles are selected from the group consisting of valve metals.

90. (Previously presented) The non-oxide powder of claim 89 wherein said primary particles are tantalum.

91. (Previously presented) The non-oxide powder of claim 90 wherein each of said tightly agglomerated compositions has a specific surface area in the range of about 1 m²/g to about 70 m²/g.

92. (Previously presented) The non-oxide powder of claim 89 wherein said primary particles are niobium.

93. (Previously presented) The non-oxide powder of claim 88 wherein said primary particles are selected from the group consisting of refractory metals.

94-95 (Canceled)

96. (Previously presented) A non-oxide powder of which at least about 40% by mass is comprised of a plurality of tightly agglomerated compositions, each of said tightly agglomerated compositions comprising a plurality of primary particles tightly agglomerated together, wherein said primary particles have an average size in a range of about 1 nanometer to about 100 nanometers, wherein said primary particles are selected from the group consisting of intermetallics.

97. (Previously presented) A non-oxide powder of which at least about 40% by mass is comprised of a plurality of tightly agglomerated compositions, each of said tightly agglomerated

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compositions comprising a plurality of primary particles tightly agglomerated together, wherein said primary particles have an average size in a range of about 1 nanometer to about 100 nanometers, wherein said primary particles are selected from the group consisting of metal matrix composites.

98-101 (Canceled)

102. (Previously presented) The non-oxide powder of claim 80 wherein at least one of said tightly agglomerated compositions further comprises a secondary material within which the primary particles of said at least one agglomerated composition are encapsulated.

103. (Previously presented) The non-oxide powder of claim 102 wherein said secondary material is selected from the group consisting of salts and polymers.

104. (Previously presented) The non-oxide powder of claim 103 wherein each of said tightly agglomerated compositions further comprises a secondary material within which its primary particles are encapsulated.

105. (Previously presented) The non-oxide powder of claim 104 wherein said powder has an encapsulation efficiency in the range of about 10% to about 99% by mass.

106. (Previously presented) The non-oxide powder of claim 105 wherein said powder has an encapsulation efficiency in the range of about 70% to about 99% by mass.

107. (Previously presented) The non-oxide powder of claim 80 wherein said primary particles are selected from the group consisting of carbon and boron.

108. (Previously presented) The non-oxide powder of claim 80 wherein said primary particles are selected from the group consisting of ceramics.

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109. (Previously presented) The non-oxide powder of claim 80 wherein said primary particles are selected from the group consisting of intermetallics.

110. (Previously presented) The non-oxide powder of claim 80 wherein said primary particles are selected from the group consisting of metal matrix composites.

111. (Previously presented) The non-oxide powder of claim 80 wherein said powder has a primary particle purity based on metal contaminants of less than about 10,000 parts per million by mass.

112. (Previously presented) The non-oxide powder of claim 111 wherein said powder has a primary particle purity based on metal contaminants of less than about 1000 parts per million by mass.

113. (Previously presented) The non-oxide powder of claim 112 wherein said powder has a primary particle purity based on metal contaminants of less than about 50 parts per million by mass.

114. (Previously presented) The non-oxide powder of claim 28 wherein, for each tightly agglomerated composition, at least about 50% of its constituent primary particles have sizes not deviating by more than a factor of 2 from the average size of its constituent primary particles, and at least about 90% of its constituent primary particles have sizes not deviating by more than a factor of 4 from the average size of its primary particles.

115 (Previously presented) The non-oxide powder of claim 28 wherein the non-oxide powder is tantalum.

116 (Previously presented) The non-oxide powder of claim 114 wherein the non-oxide powder is tantalum.

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117. (Previously presented) The non-oxide powder of claim 28 wherein the non-oxide powder is niobium.

118. (Previously presented) The non-oxide powder of claim 114 wherein the non-oxide powder is niobium.

119. (Canceled)